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# The Workshop

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## THE DEVELOPMENT OF HELIOGRAPHY, AS A BRANCH OF ART-INDUSTRY.

By LUDWIG PFAU.

It is scarcely necessary to dwell upon the importance of a discovery which has opened up so many novel and rich resources not only for pictorial illustration but for many other branches of Art-Industry. Recent as is the date of its origin, Photography has made its way into the lowest strata of society, and Heliography will enlarge its influence in a still more important degree, destined as it is to become, by the universal diffusion of pictures, a great auxiliary to education and a powerful level of progress.

Under the name of Heliography is to be understood especially the art of multiplying the photographic image, not, as of late, by the light of the sun assisted by nitrate of silver, but by means of the printing press and printing ink like a copperplate, a lithograph or a wood-cut. The advantages of such a process are obvious. Formerly the durability of the silvered impression was somewhat problematical, while on the contrary, the carbon, which is the coloring matter of the printing ink is the only pigment the durability of which is beyond all doubt. Besides which, the multiplication of copies by light will always be an operation too delicate and expensive to satisfy the requirements of commerce, as is evident from the high prices which are maintained for good photographs, notwithstanding all the progress which has been made in the art. Hence, Heliography, by its easy, cheap and quickly multiplying process, brings with it all the resources of the ordinary printing press, and may also be applied to impressions on enamel, works of ceramic art and panellings.

It is of course necessary that, in Heliography, the photographic negative should be transformed into a plate from which an impression can be taken, and the way in

which this transformation is effected produces the different methods in which the new discovery is applied. The negative forms the basis of Heliography, but instead of a positive impression being produced on a paper impregnated with nitrate of silver, it is laid upon a plate provided with a photogenic layer, which after receiving the impact of light, and being subjected to further necessary operations, acts as a printing plate, and produces impressions with the aid of color and press.

Two substances especially have come into use for the production of this sensitive film, asphalte and chrome-gelatine. The asphalte or bitumen is dissolved in a volatile oil, but loses its solubility by the operation of light. It is the same with the chrome-gelatine and water. Heliography profits by this peculiarity of the two substances by subjecting the plate of metal or glass, previously coated with a preparation of asphalte or chrome-gelatine, under the negative to the contact of the light, and makes use of the partial insolubility which results from this, to produce a drawing which may be printed off.

Since the Paris exhibition of 1855, in which there were already several admirable specimens of Heliography, the art has made immense progress, and the number of those who in 1867 exhibited a series of pictures by the printing process was proportionally important, twenty two receiving prizes. Davanne's official report upon Photography closes with the remark that the exhibition of 1867 was especially remarkable for the attempts to put an end to the use of the salts of gold and silver, and to employ printing ink for the production of sun pictures; a process to which Photography will certainly adhere for the future.

In order to form a just appreciation of the productions of Heliography we must first of all gain a clear perception of the difficulties it had to overcome. An ordinary Photograph, produced by means of nitrate of silver resembles a most delicate indian ink drawing, for as the negative from which the impression is taken consists of a more or less transparent collodium film, the light which passes through can produce a darker or lighter shading in tints which blend into one another, but not one consisting of lines or strokes which is necessary for the printing process. The engraving, which has nothing but the white of the paper and the black of the printing ink at its disposition, must mark the gradations of tint by some kind of hatching or dotting, or else there would be nothing but black blots on a white ground. However delicate the tints may be which an engraving has to exhibit, they consist exclusively of black and white points lying in close juxtaposition. Considered by itself, the blending of the tints could have been just as well produced by different thicknesses of color in a printed picture, as in an indian ink drawing, but that the mechanical operation of laying on the color results in a uniform tint of the whole. In lithography and typography, where the coloring is applied by a cylindrical roller, no graduated shading is possible; the copperplate engraver, on the contrary who lays on his color with a ball and afterwards wipes it off with a rag or his hand, so that the black only remains in the cavities, can always produce blended tints, and according as he leaves more or less color, can give to the shadows a greater or less intensity. Still it was impossible to found an engraving process on the art of printing and to look exclusively for the shading to the different depths of the incised lineaments. For even the most skilful printer would not be able to leave in every place the exact quantity of color which the tint required, and besides the ink itself would not adhere to the cavities, especially on a plate where the shading does not consist of single lines, unless protected from the cleansing rag by the grains resulting from counter hatching. Or if the color is to be preserved, a portion will remain which in the print will be changed into a blot which cannot be dried.

There must be grains, and here we arrive at the tedious and gradually conquered difficulties of Heliography, the production of these interrupted tints, by a sort of hatching or dotting process which the drawing pencil, the etching needle, the scraper and the graver effect of themselves; mezzo-tinto and aquatinta by a mechanically produced grain, and lithography by the natural texture of the stone, but which Heliography has to produce by photogenic means. It must in a certain measure change the tinted drawing of the camera obscura into one hatched or scored with the graver. Hence it is in the reproduction of etchings and drawings that it celebrated its earliest and most perfect triumphs, for here, where the half-tones are in white and black, every change is spared, and two absolute tints only have to be dealt with.

The manner in which Heliography effectuates the

preservation of the half-tones by the granulation of its metallic plate constitutes for the most part the peculiarity and the merit of the different methods of procedure. For the difficulties of all the methods would be easily overcome, if there were but one uniform grain on the whole plate as in lithography and aquatinta where the work of the hand produces the graduated shades. But in Heliography where the picture is produced by light, the grain must be of thicker or thinner structure in order to exhibit the shades in their proper force, and to change the imperceptible transitions of the forms into a drawing capable of being printed off.

It is easy to perceive that the *granulated* texture of the negative would give the easiest solution of the task. If a collodium could be produced, which under the influence of a corresponding liquid would coagulate, and more or less so according to the degree of light, the picture on the heliographic coat would of itself come out in its proper form. But this has hitherto baffled every effort, and therefore it has been attempted to granulate in a mechanical manner the collodium film, or by the interposition of a hatched or scored plate of glass before the camera to cover the negative with a light reticulation by means of a double impression. But the first method can only be employed for the reproduction of very rough and bold sketches in particular cases, and the second savours of the mechanical monotony of machine-made hatching. Another resource is the laying on a granulated substance on the heliographic layer after the light has been thrown upon it, as in aquatinta. This however could only be successful when the grain adhered in greater or less quantity in proportion to the operation of the light and thus produced a thicker or thinner structure. A third method consists of the application of certain substances whose chemical reaction under the influence of light develops a granulated drawing on the layer of gelatine. This indeed gives the best result, as the different impacts of the light required by the picture produce of themselves a gradation of granulation. The means of producing this remains however for the present a secret known but to a few heliographers. But at last two methods of printing have been successful which render the grain superfluous; the one employing gelatine color instead of ink, while the other from great difficulties in the printing is not very practicable for the reproduction of natural subjects.

Generally speaking, the different heliographic methods may be divided into three groups according as the plate is prepared by an etching process, by reaction or by casting. In the first case the sensitive film replaces the etching-ground, the impact of light the engraver, and the acid operates as in the engraving. In the second, the printing is not a purely mechanical process, but the result of a physico-chemical reaction between two materials as in lithography; the third process is specifically heliographic and consists in the casting of the relieved picture which the chrome-gelatine produces by the dissolution or the swelling of those parts which the light does not reach. A consideration of these several methods,

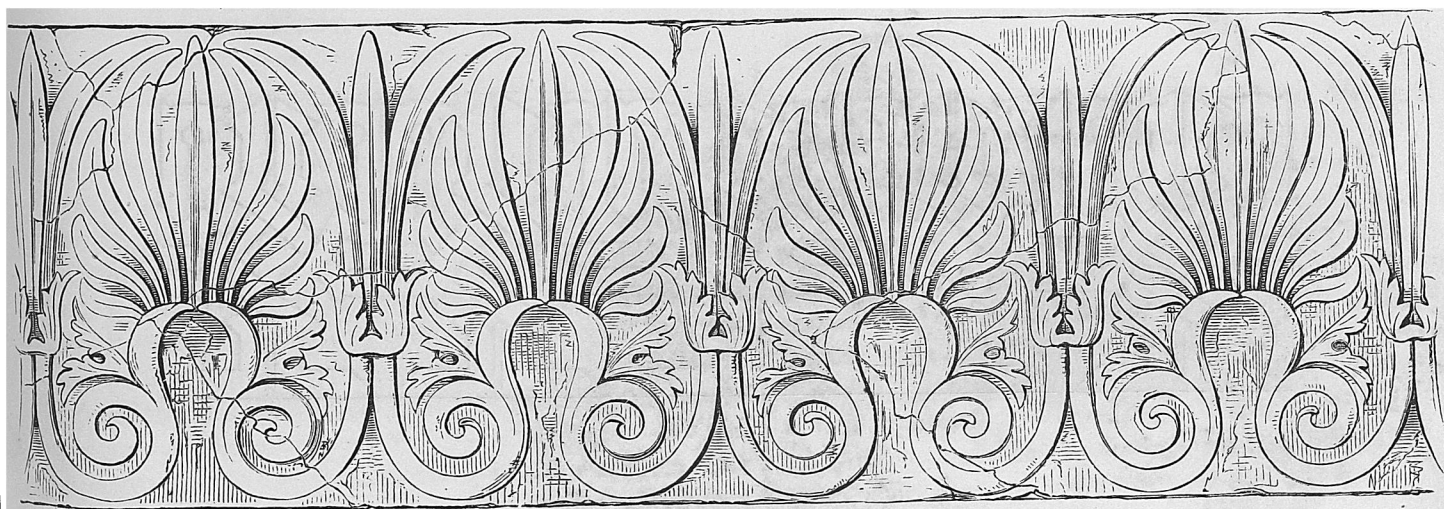
which we purpose to illustrate in a second article, will bring out more exact details. The several groups have, each in their own way, produced satisfactory specimens, though they take two different directions. The first part attempts to approach the copperplate engraving, and to do away as far as possible with the mechanic of the optical process, to which category belong the copper-press and especially the etching; the second leaves the photographic picture in all its peculiarities but facilitating and multiplying its reproductions solely by the help of the press, as in the casting process and especially in the printing with gelatine color. The reaction process holds a middle place between these two. It would be premature to pronounce any judgement on the future of these several methods; probably some practical application will make its way out of each of these groups, as they all present some good features. The greatest difficulties seem to stand in the way of the etching process which has the highest artistic aim; and if lithography, by its physico-chemical affinity lends itself most readily to heliographic purposes, it is not, on the other hand to be overlooked that casting as a special photographic process, by its durability and the variety of its application, offers no small advantage.

On the whole, Heliography has until now occupied itself especially with copperplate engraving and neglected typography. If, however, impressions are to be produced from natural subjects it must before all make use of

that method of printing which offers the greatest resources. The printing-press is but little adapted for producing tinted pictures and is moreover exposed to the above mentioned difficulties. Still several heliographers have produced some extremely good typographical specimens from nature, but these proofs of heliographic applicability have not yet succeeded in obtaining any considerable industrial value. In many cases, where an authentic copy and not a graphical representation is the chief desideratum, typography, will certainly derive many advantages from the heliographic subjects from nature; but whether it can satisfy the æsthetic requirements in this department, with its liability to fill up the delicately grained cavities, is another question, but not a very difficult one. For the rest, Heliography cannot be expected to adapt itself to all kinds of printing, but only such as may correspond to its proper task. The principal point also for typography is not the copying nature, but the reproduction of drawings. But this problem may be considered as solved by the specimens from several studios, and if the trade has not yet in great measure profited by this method of economising wood-cuts, the fault lies partly in the reluctance to leave the beaten path, but principally in that secrecy and monopoly which always circumvent themselves, for it is only by publicity and the force of intercourse that the best inventions succeed in realising their vitality.

*(The conclusion in our next.)*

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